KRUEGER ENTERPRISES, INC.
GEOCHRON LABORATORIES DIVISION

24 BLACKSTONE STREET • CAMBRIDGE, MA. 02139 • (617)-876-3691

RADIOCARBON AGE DETERMINATION — **REPORT OF ANALYTICAL WORK**

Our Sample No. GX- 10233 — **Date Received:** 03-23-84

Your Reference: — **Date Reported:** 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW6. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709). Job # GS3223, Work Order #11693.

AGE = (21.6 +/- 1.1)% of the modern standard activity.
(2.92 +/- 0.14) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

Raw "age" is 12330 +/- 390 C-14 years B.P.

δC^{13}_{PDB} = -5.9 $^{o}/_{oo}$.

Notes: **This date is based upon the Libby half life (5570 years) for C^{14}. The error stated is $\pm 1\ \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.**

The age is referenced to the year A.D. 1950.

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RADIOCARBON AGE DETERMINATION | **REPORT OF ANALYTICAL WORK**

Our Sample No. GX- 10234 | **Date Received:** 03-23-84

Your Reference: | **Date Reported:** 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW7. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709). Job # GS3223, Work Order #11693.

AGE = (11.6 +/- 1.0)% of the modern standard activity.
(1.58 +/- 0.13) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

Raw "age" is 17280 +/- 680 C-14 years B.P.

δC^{13}_{PDB} = -5.7 ‰

Notes: **This date is based upon the Libby half life (5570 years) for C^{14}. The error stated is $\pm 1\sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.**

The age is referenced to the year A.D. 1950.

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GEOCHRON LABORATORIES DIVISION

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RADIOCARBON AGE DETERMINATION — **REPORT OF ANALYTICAL WORK**

Our Sample No. GX- 10235 — **Date Received:** 03-23-84

Your Reference: — **Date Reported:** 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW8. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709). Job # GS3223, Work Order #11693.

AGE = Sample too small for C-14 analysis.
Analysed for C-13, see below.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

$\delta C^{13}_{PDB} = -12.0$ ‰.

Notes: **This date is based upon the Libby half life (5570 years) for C^{14}. The error stated is $\pm 1\ \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.**

The age is referenced to the year A.D. 1950.

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RADIOCARBON AGE DETERMINATION — **REPORT OF ANALYTICAL WORK**

Our Sample No. GX- 10236 — **Date Received:** 03-23-84

Your Reference: — **Date Reported:** 04-02-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: Drill Water. Ponce Waste Facility, PR. (EPA ID # PRD 980594709).
Job # GS3223, Work Order #11693.

AGE = (119.1 +/- 2.3)% of the modern standard activity.
(16.15 +/- 0.32) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

Raw "age" is modern, present day.

δC^{13}_{PDB} = -9.5 ‰.

Notes: This date is based upon the Libby half life (5570 years) for C^{14}. The error stated is $\pm 1\ \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. GX- 10241 — **Date Received:** 03-23-84

Your Reference: — **Date Reported:** 04-09-84

Submitted by: Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Sample Name: MW8. Ponce Waste Facility, Puerto Rico. (EPA ID # PRD 980594709). Job # GS3223, Work Order #11693. Replacement for GX-10235.

AGE = (13.0 +/- 1.0)% of the modern standard activity.
(1.76 +/- 0.13) dpm/g Carbon.

Description: Barium carbonate precipitated from water.

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. C-13 analysis was made on a small portion of the same evolved gas.

Comment:

Raw "age" is 16,390 ± 610 C-14 years B.P.

δC^{13}_{PDB} = -4.6 ‰

Notes: This date is based upon the Libby half life (5570 years) for C^{14}. The error stated is $\pm 1\ \sigma$ as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

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GEOCHRON LABORATORIES DIVISION

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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84
Date Reported: 4/2/84
Your Reference: Job #GS3223
Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
HSCOR-29008	Monitoring Well #2	Carbonate	- 9.0
HSCOR-29009	" " #3	"	- 5.1
HSCOR-29010	" " #4	"	- 3.8
HSCOR-29011	" " #6	"	- 5.9
HSCOR-29012	" " #7	"	- 5.7
HSCOR-29013	" " #8	"	-12.0*
HSCOR-29014	Drilling Water	"	- 9.5

* very low carbonate content

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard}$	= 0.000316**
$R_{standard}$	= 0.011237
$R_{standard}$	= 0.0039948**
$R_{standard}$	= 0.0450045

**Double atom ratio

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GEOCHRON LABORATORIES DIVISION

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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/10/84

Your Reference: Job #GS3223
Work Order #11693
Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
SHOR-29015	S-1	Carbonate from Surface Water	- 9.0
SHOR-29016	S-2	" "	-13.7
SHOR-29017	S-3	" "	-12.0
SHOR-29018	S-4	" "	-12.2
SHOR-29019	S-5	" "	- 8.2
SHOR-29020	S-6	" "	-11.3

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard} = 0.000316$**
$R_{standard} = 0.011237$
$R_{standard} = 0.0039948$**
$R_{standard} = 0.0450045$

**Double ata=

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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:

Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84

Date Reported: 4/2/84

Your Reference: Job #GS3223
Work Order #11693
Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis* δC^{13}	Analysis* δO^{18}
COR-29021	Well MW-4	Rock Chip	-0.1	+30.0
COR-29022	" "	" "	-0.2	+29.6
COR-29023	Well MW-8	" "	-0.5	+29.4
COR-29024	" "	" "	+0.3	+29.5

Two different chip samples were collected in place from outcrops near the collar of each well.

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard}$ = 0.000316**
$R_{standard}$ = 0.011237
$R_{standard}$ = 0.0039948**
$R_{standard}$ = 0.0450045

**Double atom ratio

KRUEGER ENTERPRISES, INC.
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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road
Marietta, GA 30067

Date Received: 4/4/84
Date Reported: 4/10/84
Your Reference: Job #GS3223
Work Order #11693
(Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*
			δC^{13}
HSCOR-29246		Monitoring Well #8 Water Resampled	-4.6

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}{}^{‰} = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard} = 0.000316$**
$R_{standard} = 0.011237$
$R_{standard} = 0.0039948$**
$R_{standard} = 0.0450045$

**Double atom ratio

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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84
Date Reported: 4/2/84
Your Reference: Job #GS3223
Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*	
			δD	δO^{18}
HSCOR-29008	Monitoring Well #2	Water	-22	-3.8
HSCOR-29009	" " #3	"	-19	-2.8
HSCOR-29010	" " #4	"	-20	-3.0
HSCOR-29011	" " #6	"	-16	-2.9
HSCOR-29012	" " #7	"	-13	-2.2
HSCOR-29013	" " #8	"	-12	-2.2
HSCOR-29014	Drilling Water		- 5	-1.7

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard} = 0.000316$**
$R_{standard} = 0.011237$
$R_{standard} = 0.0039948$**
$R_{standard} = 0.0450045$

**

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STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by:
Law Engineering Testing Co.
2749 Delk Road, S.E.
Marietta, GA 30067

Date Received: 3/23/84
Date Reported: 4/10/84
Your Reference: Job #GS3223
Work Order #11693

Ponce Waste Facility (EPA ID #PRD 980594709)

Our Lab. Number	Your Sample Number	Description	Analysis*	
			δD	δO^{18}
SHOR-29015	S-1	Surface Water	- 9	-1.8
SHOR-29016	S-2	" "	-13	-2.3
SHOR-29017	S-3	" "	-13	-2.0
SHOR-29018	S-4	" "	-14	-1.7
SHOR-29019	S-5	" "	-14	-1.8
SHOR-29020	S-6	" "	-12	-1.8

*Unless otherwise noted, all analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1\right] \times 1000$$

Where:

D/H	standard is SMOW
C^{13}/C^{12}	standard is PDB
O^{18}/O^{16}	standard is SMOW
S^{34}/S^{32}	standard is Cañon Diablo troilite

And:

$R_{standard} = 0.000316$**
$R_{standard} = 0.011237$
$R_{standard} = 0.0039948$**
$R_{standard} = 0.0450045$

**Double atom ratio